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# Fourteen Dimensions of Temperament

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# Fourteen Dimensions of Temperament

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## The Problem

One of the most widely used approaches to the assessment of personality traits in individuals has been that of the personality inventory. In this approach, the overt indices of traits, the items of information concerning the person from which trait values are inferred, are in the form of his responses to questions or statements about his habits, his likes and dislikes, and his opinions. In interpreting this information, although much attention is given to the literal meanings of the questions and answers, the psychological traits indicated are more properly decided on the basis of empirical evidence. The empirical evidence has often been based upon correlations among the items, and between the items and selected criteria. Sometimes the summarizing device that is applied to the correlations has been that of factor analysis.

The earlier factor analyses by the senior author and others (5, 6, 7, 10, 12) were based upon the intercorrelations of single items. When there was little known as to which item would indicate a trait in common, this was the best procedure. Also, at that time, the number of inventory items in existence was much smaller than now.[1] After determining the underlying factors and their apparent properties, the senior author proceeded to develop three personality inventories: *An Inventory of Factors STDCR*, *An Inventory of Factors GAMIN*, and *The Personnel Inventory*, with H. G. Martin as co-author of the last two (2, 8, 9). In their development, new items were written for each factor. These, and the old ones, were put through the process of internal-consistency item analysis to form pools of items, with scoring weights, to develop a measuring scale for each factor, primary trait, or primary dimension of personality.

Before going further, it is desirable for us to review the names of the factors. The factors of *Inventory GAMIN* will be mentioned first, in agreement with the order used hereafter in this report:

G —General activity
A —Ascendance vs. submission
M —Masculinity vs. femininity
I —Confidence vs. inferiority feelings
N —Calmness, composure vs. nervousness
S —Social introversion-extraversion; seclusiveness vs. sociability
T —Thinking introversion-extraversion; reflectiveness
D —Depression vs. cheerfulness
C —Cycloid disposition vs. emotional stability
R —Rhathymia; unconcern vs. seriousness
O —Objectivity vs. subjectivity
Ag—Agreeableness vs. belligerence
Co—Cooperativeness, tolerance vs. criticalness, fault-finding

The present report is concerned with a comprehensive factor analysis that involves all 13 factors. A new analysis seemed very much needed for several reasons. The analyses on which the inventory construction had been based were limited in scope. In no one analysis, to our knowledge, have

[1] Rumor has it that there now exists a file of some 10,000 inventory items at one of our major universities.

all 13 factors been properly represented. The senior author's analysis on which the three factors of the *Personnel Inventory* were based was never published.[2] In recent years some questions have been raised concerning whether the same area of temperament can be accounted for on the basis of a smaller number of factors (11, 13). The existence of some of the factors has been questioned. For example, in listing what he considers to be the established factors, French (1) does not include the factor Co.

The evidence that might be interpreted to indicate a smaller number of factors than 13 will now be reviewed very briefly. Lovell (11) intercorrelated the 13 inventory scores and extracted six factors, using estimated communalities in the diagonal cells of the correlation matrix. She appropriately interpreted the resulting dimensions as being "super-factors."

To some extent, Lovell's super-factors account for actual intercorrelations among the 13 psychological factors. In this sense, they would approach what Thurstone calls "second-order" factors. In our opinion, however, they are by no means identical with the second-order factors that one would find by an ordinary oblique-rotation solution involving the 13 first-order factors. The correlations among the 13 inventory *scores* are undoubtedly higher than the correlations among the 13 *factors*. In part, the additional covariances among scores arise from the fact that the score variables are not experimentally independent. In *Inventory STDCR*, and to some extent in *Inventory GAMIN*, and as between the two, many items are weighted similarly in two or more keys, since many items themselves are indicators of two or more factors. Thus, some specific and error variances represented in certain items contribute spuriously to intercorrelations. Another source, even when items are keyed for only one factor, is the tendency for items scored for one factor to be loaded systematically on some other factor. Lovell was aware of these facts and appropriately concluded that the super-factors represent "factors" common to the inventory *scores*.

In his analysis, Thurstone asked the appropriate question as to the actual dimensionality represented by the 13 scores. Using Lovell's correlation matrix, he entered estimates of reliability in the diagonal cells. This introduces specific variances into the picture, making it possible, under the right conditions, for 13 factors to appear.

Unfortunately, in addition to the already-noted lack of experimental independence of the 13 scores and the factorial complexity of items, and their effect upon the intercorrelations, there is a further difficulty stemming from the fact that Thurstone used estimates of reliability presented in the test manuals; in other words, not those based upon the same sample from which the intercorrelations were obtained. In this type of solution, the number of factors obtained depends very much upon the accuracy of the estimates of reliability and upon their consistency with the intercorrelations. It is unlikely that the reliability estimates he used are inflated in keeping with the intercorrelations. As a matter of fact, they are more likely to be underestimates. If they are too small the number of factors is also likely to be underestimated. In fairness to Thurstone, it should be said that he discusses these sources of error, but he concluded that they would not invalidate his analysis (13, p. 13).[3]

Thurstone found nine dimensions in the factor structure of his solution. Seven of these were given psychological interpretations, with names that are somewhat different from those used for roughly corresponding factors listed above. The remaining two he regarded as residual factors. Thus, the seven accepted factors fall far short of the hypothesized 13.

## Procedure

In attempting to determine whether a certain factor exists, it is good practice in a factor analysis to make sure that there are at least three experimental variables present to represent that supposed variable. We therefore applied this principle to the study of our 13 hypothesized factors.[4] Furthermore, for a more convincing test of the hypotheses, it was decided to base the analysis upon the same fundamental

[2] It can be reported here that this analysis had been initiated in collaboration with Dr. Don W. Dysinger, as a consequence of the clinical insight of Dr. Roswell H. Johnson. In his use of the *Humm-Wadsworth Temperament Scale* in counseling, Dr. Johnson became convinced that the Paranoid score involves three distinct variables. This conclusion was verified by the factor analysis. In a published report, Mosier (12) has reported Factor O, interpreting it in terms of its opposite pole, hypersensitivity.

[3] The senior author has expressed elsewhere at length his views concerning the use of total scores from inventories in general in factor analyses (3).

[4] The initial steps in this investigation were a joint effort of the senior author and Earl L. Taylor, whose fatal illness prevented his continuing beyond the stage of factor extractions. We should have been glad to list him as co-author, but felt that it would be unfair to commit him to expressions of views of which he might not have approved.

data as Lovell and Thurstone had used. Dr. Lovell placed at our disposal the original test booklets, which fortunately had been preserved.[5]

In obtaining several scores for each factor, we might have divided the keyed items for each factor randomly into three or more pools. We rejected this idea in favor of a more rational approach; an approach that would give us more information concerning the nature of the factors. By inspection of content and from consideration of relevant, previous statistical information, we combined items into small, homogeneous groups. Two investigators[6] independently categorized the items for each factor, then, after discussion, eliminated any items on which there was disagreement. The resulting score variables are listed below.

*The score variables.* Each score variable, or test, is indicated by the factor letter symbol with a subscript followed by a descriptive title. A sample item is given for each variable.[7] The number in parentheses indicates the number of items in the test.

1. $G_1$ *Rapid Pace:* Do you usually eat more rapidly than the average person, even though there is plenty of time? (6)
2. $G_2$ *Drive for Activity:* Are you the kind of person who is "on the go" all the time he is awake? (3)
3. $G_3$ *Energy:* Do you often feel bubbling over with excess energy? (2)
4. $G_4$ *Liking for Action:* Are you happiest when you get involved in some project that calls for rapid action? (3)
5. $G_5$ *Quickness:* Are you inclined to be quick in your actions? (2)
6. $A_1$ *Being Conspicuous:* Do you dislike to have people watch you while you are working? (4)
7. $A_2$ *Maintaining One's Rights:* Do you ever protest to a waiter or clerk when you think you have been overcharged? (10)
8. $A_3$ *Self Defense:* Are you rather good at bluffing when you find yourself in difficulty? (4)
9. $A_4$ *Social Initiative:* Do you ever take the initiative to enliven a dull party? (6)
10. $A_5$ *Fear of Social Contacts:* Have you ever been hesitant to make applications for a job in person? (6)
11. $M_1$ *Fearfulness:* Are you afraid of snakes? (11)
12. $M_2$ *Inhibition of Emotional Expression:* Do you cry rather easily? (7)
13. $M_3$ *Masculine Vocational Interests:* Would you rather be a florist than a miner? (5)
14. $M_4$ *Masculine Avocational Interests:* Do you prefer going to a dance rather than to a prize-fight? (8)
15. $M_5$ *Disgustfulness:* Do odors of perspiration disgust you? (6)
16. $M_6$ *Sympathy:* Do you feel deeply sorry for a bird with a broken wing? (3)
17. $I_1$ *Personal Strengths and Weaknesses:* Are you physically stronger than most of your friends of the same sex? (7)
18. $I_2$ *Feeling of Adequacy:* Do you always know what to do next? (7)
19. $I_3$ *Self Confidence vs. Inferiority Feelings:* Do you always feel that you can accomplish the things you want to do? (6)
20. $I_4$ *Discontent with Self and Status:* Do you ever wish that you were taller or shorter than your are? (9)
21. $I_5$ *Feeling of Acceptance by Others:* Are you frequently afraid that other people will not like you? (7)
22. $N_1$ *Tense-excited vs. Calm-relaxed:* Can you relax easily when lying or sitting down? (6)
23. $N_2$ *Restlessness:* Can you usually sit still without fidgeting? (6)
24. $N_3$ *Nervousness and Jumpiness:* Do long-continued noises "get on your nerves"? (8)
25. $N_4$ *Annoyance and Irritability:* Did you ever become so angry at your work that you threw tools about or broke them? (8)
26. $N_5$ *Fatigueability:* Do you wake up feeling tired in the morning? (6)
27. $S_1$ *Liking for Friends and Acquaintances:* Do you enjoy getting acquainted with most people? (4)
28. $S_2$ *Social Leadership:* In social conversations, are you usually the listener rather than the talker? (4)
29. $S_3$ *Social Poise:* Does it embarrass you a great deal to say or do the wrong thing in a social group? (5)
30. $S_4$ *Liking the Limelight:* Do you generally feel uncomfortable when you are the center of attention on a social occasion? (4)
31. $S_5$ *Shyness, Bashfulness:* Do you have to fight against bashfulness? (3)
32. $S_6$ *Gregariousness:* Do you like to mix socially with people? (4)
33. $S_7$ *Liking for Social Affairs:* Do you like to have many social engagements? (2)
34. $T_1$ *Meditativeness:* Do you like to have time to be alone with your thoughts? (4)
35. $T_2$ *Liking for Serious Thinking:* Do you like to

[5] We wish to express our thanks to Dr. Lovell for her generosity.

[6] Mr. Taylor and the senior author.

[7] Items are quoted by permission of the copyright holder.

discuss the more serious questions of life with your friends? (4)

36. $T_3$ *Analysis of Self and Others:* Do you often speculate about why people behave as they do? (4)
37. $D_1$ *Emotional Depression:* When you stop to consider your future does it seem very optimistic? (4)
38. $D_2$ *Worry, Anxiety:* Have you ever lost sleep over your worries? (2)
39. $D_3$ *Cheerfulness:* Are you usually in good spirits? (2)
40. $D_4$ *Loneliness:* Do you feel lonesome even when with other people? (2)
41. $D_5$ *Physical Depletion:* Have you often felt listless and tired for no good reason? (2)
42. $D_6$ *Feelings of Guilt:* Do you often have a feeling of unworthiness? (2)
43. $C_1$ *Emotional Fluctuations:* Do you ever change from happiness to sadness or vice versa, without good reason? (5)
44. $C_2$ *Emotional Excitability:* Are you often in a state of excitement? (4)
45. $C_3$ *Emotional Perseveration:* Do you find it difficult to go to sleep at night because experiences of the day "keep running through your head"? (4)
46. $C_4$ *Emotional Immaturity:* Does it upset you much to lose in a competitive game? (6)
47. $C_5$ *Absentmindedness:* Does your mind often wander while you are trying to concentrate? (3)
48. $C_6$ *Daydreaming:* Do you often think or dream of what you will be doing five years from now? (8)
49. $R_1$ *Carefreeness vs. Restraint:* Are you ordinarily a carefree individual? (4)
50. $R_2$ *Impulsiveness:* Are you inclined to act on the spur of the moment without thinking things over? (5)
51. $R_3$ *Seriousness vs. Unconcern:* Do you ever take your work as if it were a matter of life and death? (3)
52. $R_4$ *Liking for Action and Excitement:* Do you often crave excitement? (3)
53. $R_5$ *Reticence:* Do you dislike to talk about yourself, even to close friends? (2)
54. $R_6$ *Rapport with the Environment:* Do you become so absorbed in watching an athletic contest that you completely forget yourself? (2)
55. $O_1$ *Egocentrism:* Do you often feel that a lecturer is talking about you personally? (8)
56. $O_2$ *Hypersensitivity:* When you are criticized does it disturb you badly? (5)
57. $O_3$ *Ideas of Reference:* Are you bothered by the idea that someone is reading your thoughts? (5)
58. $O_4$ *Unwarranted Sympathy:* Do you sometimes feel sorry for all the people in the world? (4)
59. $Ag_1$ *Contempt for Others:* Do you sometimes think that most people are stupid? (8)
60. $Ag_2$ *Resistance to Control:* Have you very much resented having members of your family or friends give you orders? (4)
61. $Ag_3$ *Hostility:* Is it difficult for you not to bear a grudge against someone who has injured you? (7)
62. $Ag_4$ *Overt Aggression:* Do you enjoy taking part in a good fight? (5)
63. $Co_1$ *Faultfinding with Human Nature:* Do you believe that most people shirk their duties whenever they can do so? (11)
64. $Co_2$ *Faultfinding with Society:* Do you believe that only people with money can get a square deal in the courts of law? (6)
65. $Co_3$ *Faultfinding with Industry:* Do many men deserve higher pay than their bosses? (6)
66. $Co_4$ *Trusting Honesty in Others:* Can most people be trusted completely? (5)
67. $Co_5$ *Suspicion of Hypocrisy:* Do you think that most people who help others secretly dislike doing so? (6)
68. $Co_6$ *Suspicions of Actions:* Were you ever ignored or "given a raw deal" through spite? (7)
69. $Co_7$ *Victim of Hard Luck:* Does it seem to you that other people "have all the luck"? (5)
70. $M_7$ *Male Sex Membership.*

*Testing and scoring.* The sample of students tested by Lovell included 126 men and 87 women, or a total of 213. They were tested under what would seem to be favorable conditions for obtaining truthful cooperation. Since both sexes were represented, we added to the experimental variables the male-female dichotomy, which was correlated with all score variables by estimating point-biserial coefficients. The inclusion of the sex-membership variable was designed to pinpoint the masculinity-femininity factor, thus to clarify the factor structure in other respects.

The items in each test were scored consistent with the key for its factor, with uniform scoring weights of one and zero. A high score for each test was thus indicative in the direction of the trait as named previously in the list of the 13 factors. This meant that all variables were scored in the more socially approved direction except in the case of factors S, T, D, and C (assuming the extroverted and emotionally

adjusted poles in each case to be more socially approved).

*The correlation matrix.* Since most of the score variables were derived from small numbers of items, sometimes as small as two, we dichotomized every score distribution. Assuming that the distribution of the quality represented by each score variable is normal in the population, we estimated tetrachoric coefficients among the scores, by means of the cosine-pi approximation. Since the points of dichotomy were generally in the region of the medians, the approximations may be accepted as having negligible biases.[8]

*The factor analysis.* Eighteen centroid factors were extracted using punched-card equipment.[9] Extractions were continued so as to include a liberal number of factors. A few residuals as large as .10 remained, but with a sample of about 200 and with tetrachoric *r*'s, it was thought that little or no genuine common-factor variances were overlooked. As it turned out, after rotations four factors were regarded as residuals. The centroid factor matrix is given in Table 1.

Axes were rotated by the Zimmerman graphic, orthogonal method (14), the major criterion being simple structure. Since the reflection of the S, T, D, and C variables led to a correlation matrix with few negative coefficients, the criterion of positive manifold was also a guide. Although there is probably some correlation among some of the factors (to be noted later), we preferred orthogonal rotations as a better approach to a verification study of the factors. It has been found by experience that orthogonal rotations yield more reproducible results (results less dependent upon the composition of the particular test battery). We are also of the opinion that the correlations of oblique axes in a particular analysis are not necessarily good estimates of correlations between psychological factors.

The rotated factor matrix is given in Table 2. It will be noted that a very liberal number of zero loadings was achieved, indicating good, orthogonal, simple structure.[10] Fourteen of the factors may not be regarded as residuals, hence the dimensionality represented in this analysis is at least 14.

## Interpretation of the Factors

All 13 of the hypothesized factors were essentially verified. The definition and scope of two factors—C and R—are somewhat different, however, and a fourteenth factor emerged, borrowing some properties formerly attributed to Factors C and R. In general, the use of meaningful, homogeneous scoring variables helps very much to clarify the meanings of most of the factors.

In discussing each factor, in turn, we first list the tests that have significant loadings on the factor. A significant loading for interpretation purposes is arbitrarily defined as being .30 or greater, positive or negative. For each test variable is given its number, its name, its loading on the factor under discussion, and finally significant loadings for that test on other factors. The algebraic sign of a loading is stated with respect to the factor name and the test trait. That is, where a loading is positive, there is a positive correlation between the quality described in the trait name and the quality of the factor.

Where another factor tends to be repeatedly loaded in tests of a certain factor list, the loadings are listed in a column to

[8] The correlation matrix is not included in this report, to conserve on publication space.

[9] We are indebted to Mr. Norman W. Kettner for supervising this part of the investigation.

[10] The algebraic signs for score variables S, T, D, and C are consistent with the general reflections of those variables in the correlation matrix.

TABLE 1

CENTROID FACTOR MATRIX*

| Test | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | $h^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | −03 | −05 | 31 | −01 | −23 | 18 | −19 | −24 | 19 | −16 | 25 | 16 | 17 | 11 | −03 | −11 | 07 | −03 | 49 |
| 2 | −01 | 06 | 44 | −07 | −19 | 17 | −14 | −22 | −10 | 12 | −14 | −09 | 17 | 07 | 18 | −05 | 10 | 20 | 51 |
| 3 | 18 | 09 | 35 | 08 | 20 | 10 | −26 | −26 | 21 | −16 | 12 | −19 | −12 | 10 | 08 | −08 | 12 | 07 | 53 |
| 4 | 02 | −20 | 35 | 21 | −09 | 12 | −11 | −19 | 25 | 22 | 15 | 07 | −11 | −08 | 12 | 16 | −13 | 09 | 50 |
| 5 | 18 | 22 | 24 | −08 | 13 | −19 | −27 | −10 | −14 | 09 | 19 | 13 | −20 | 06 | 05 | 02 | −11 | −15 | 44 |
| 6 | 50 | 09 | 38 | −12 | −21 | −11 | 10 | 10 | −14 | −11 | −13 | 21 | −10 | 07 | 06 | 22 | 03 | −04 | 66 |
| 7 | 30 | −19 | 37 | −15 | −12 | −26 | −10 | 29 | −19 | 25 | 18 | −33 | 14 | 19 | 13 | 29 | −10 | −04 | 87 |
| 8 | 40 | −20 | 29 | −19 | −29 | −13 | −22 | 14 | −08 | −07 | −08 | −09 | 14 | 20 | −11 | −16 | −09 | −02 | 62 |
| 9 | 38 | 12 | 57 | −35 | 03 | 17 | −07 | 08 | −08 | 11 | 18 | 17 | −10 | −13 | 12 | 04 | −10 | 05 | 78 |
| 10 | 41 | 15 | 43 | 05 | −14 | −08 | 14 | −08 | −11 | −08 | −11 | 08 | 06 | 11 | −21 | 10 | −11 | 02 | 55 |
| 11 | 43 | −40 | 05 | 10 | −17 | 10 | −16 | 08 | −29 | −23 | −10 | 30 | −06 | −04 | −05 | −05 | −09 | −06 | 69 |
| 12 | 39 | −41 | −11 | −12 | −02 | 18 | −12 | −21 | −01 | −05 | −11 | 11 | −15 | −17 | 12 | −08 | −09 | 05 | 55 |
| 13 | 32 | −38 | −09 | 20 | −21 | 24 | 07 | −11 | −19 | 10 | 12 | −15 | −14 | −11 | 06 | 05 | −08 | −16 | 76 |
| 14 | 27 | −05 | −16 | 19 | 06 | 09 | −19 | −02 | −26 | −09 | 06 | −04 | 05 | −12 | 02 | 14 | −04 | −20 | 76 |
| 15 | 07 | −19 | −13 | 29 | −12 | 08 | −22 | 27 | −26 | −20 | −01 | 08 | −22 | −12 | 11 | −11 | −23 | 05 | 54 |
| 16 | 29 | −46 | 02 | −04 | −10 | −07 | 23 | 15 | 13 | 11 | 18 | 24 | 21 | −09 | 15 | −26 | 12 | −12 | 68 |
| 17 | 44 | −09 | 30 | −03 | −16 | 13 | −07 | −15 | 43 | −11 | 13 | −12 | 07 | 02 | −10 | −05 | −06 | −20 | 65 |
| 18 | 38 | −11 | 31 | −16 | −27 | −02 | −13 | −16 | −09 | −07 | −04 | 11 | −02 | −12 | 03 | −01 | 20 | −12 | 68 |
| 19 | 31 | −14 | 32 | −28 | −16 | −09 | 06 | −24 | 15 | −15 | −17 | 17 | −05 | −02 | −02 | 06 | 13 | 10 | 69 |
| 20 | 68 | 13 | 14 | −12 | −21 | 06 | 02 | −16 | 10 | −13 | −20 | −20 | 09 | −07 | 18 | −05 | 02 | −07 | 75 |
| 21 | 55 | 27 | 10 | −07 | −27 | −06 | 25 | −09 | 11 | −18 | 11 | −18 | −13 | 03 | −06 | 27 | −06 | −07 | 73 |
| 22 | 56 | −27 | −11 | 09 | 16 | −10 | 22 | 13 | 08 | −32 | 06 | −19 | −10 | 09 | −11 | 03 | 09 | 25 | 76 |
| 23 | 57 | 01 | −07 | −15 | 11 | −29 | 15 | 13 | −03 | −01 | 19 | 04 | −12 | 13 | −20 | −18 | 09 | −06 | 64 |
| 24 | 68 | −11 | −23 | −15 | 08 | 07 | −09 | 16 | 03 | −22 | 04 | −16 | −13 | 30 | 17 | −11 | 03 | 22 | 87 |
| 25 | 55 | 14 | −30 | 05 | −08 | 30 | −12 | 09 | 18 | −20 | −11 | −06 | −15 | 10 | −09 | −16 | 06 | 09 | 70 |
| 26 | 49 | 09 | −13 | −17 | 23 | −04 | −19 | 10 | 21 | −12 | 17 | 18 | 04 | 18 | 19 | −08 | −13 | −20 | 65 |
| 27 | 46 | 31 | 22 | 09 | 08 | 14 | 24 | 24 | 12 | 17 | −11 | −15 | −04 | −17 | −10 | 18 | −15 | −20 | 72 |
| 28 | 38 | 29 | 50 | −19 | −02 | 11 | −12 | 28 | −17 | 13 | 20 | −07 | −10 | −04 | −17 | −07 | −08 | 12 | 78 |
| 29 | 62 | 10 | 37 | −17 | −09 | −10 | 08 | −09 | −10 | −11 | 15 | −11 | −09 | −06 | −15 | −16 | −05 | 16 | 74 |
| 30 | 46 | 38 | 42 | −17 | 14 | −12 | −16 | 20 | −10 | 21 | −12 | 01 | −10 | −17 | −10 | 12 | 15 | 16 | 84 |
| 31 | 55 | 38 | 35 | −11 | −13 | −21 | −03 | 13 | 05 | 06 | −20 | −12 | −06 | −13 | −15 | −05 | −15 | 05 | 79 |
| 32 | 17 | 24 | 43 | 12 | 08 | 22 | 32 | −10 | 08 | 18 | −09 | 11 | 09 | 10 | 12 | 07 | 14 | 17 | 60 |
| 33 | 30 | 18 | 52 | 29 | 22 | 24 | 16 | −10 | 13 | 18 | 05 | 14 | −13 | −10 | −19 | −26 | −09 | 22 | 88 |
| 34 | 56 | −11 | −12 | −12 | 24 | 04 | −16 | −11 | 10 | 23 | −13 | 07 | −06 | 21 | −06 | 13 | 07 | 05 | 61 |
| 35 | 31 | 03 | −23 | −10 | 41 | −02 | −16 | −33 | −19 | 11 | −28 | −06 | −09 | 29 | −04 | −16 | −18 | −10 | 75 |
| 36 | 13 | −05 | −11 | 08 | 14 | −17 | 10 | −12 | −09 | 16 | −30 | 05 | 15 | 14 | 05 | 14 | −11 | −07 | 32 |
| 37 | 50 | −06 | 04 | −12 | 21 | 26 | −07 | 23 | −03 | −18 | −07 | 20 | 15 | 18 | −11 | 05 | 32 | 10 | 70 |
| 38 | 58 | −26 | −18 | 06 | 37 | −29 | 14 | −02 | 02 | −08 | 14 | 12 | 09 | −08 | −18 | −14 | 03 | −04 | 79 |
| 39 | 44 | 04 | 10 | −15 | 43 | 25 | 23 | 14 | −09 | −22 | −19 | −11 | 11 | −07 | 16 | −10 | 16 | −21 | 77 |
| 40 | 62 | 02 | −19 | −15 | 09 | 14 | −07 | −13 | 06 | −02 | −29 | 02 | 20 | −07 | −07 | 10 | −24 | 09 | 71 |
| 41 | 67 | 03 | −12 | −16 | 28 | 13 | −06 | −09 | 05 | −07 | 12 | 13 | 10 | −12 | −04 | 09 | 08 | −10 | 69 |
| 42 | 61 | 16 | −09 | −23 | 11 | −14 | 13 | −15 | −16 | −13 | 18 | 03 | 13 | −16 | 08 | 05 | −17 | 11 | 70 |
| 43 | 61 | −10 | −05 | −15 | 31 | 36 | 03 | 10 | 21 | 05 | 10 | −06 | 14 | −14 | −04 | 17 | 11 | 08 | 79 |
| 44 | 47 | −38 | −28 | −12 | −26 | 20 | 22 | −06 | −10 | 13 | −08 | 09 | −23 | −08 | −07 | −05 | 06 | −09 | 74 |
| 45 | 49 | −24 | −28 | −27 | 16 | −09 | 08 | 06 | 09 | 10 | 15 | 18 | −03 | −21 | −29 | 08 | 14 | −13 | 74 |
| 46 | 25 | 05 | −27 | −27 | −26 | 20 | 33 | −10 | −19 | −15 | 07 | −16 | 17 | −06 | −06 | −03 | 11 | −13 | 59 |
| 47 | 57 | −05 | −13 | −43 | 17 | −03 | 11 | −15 | 16 | 24 | 13 | 01 | −08 | 06 | 23 | −19 | 05 | 14 | 81 |
| 48 | 56 | −09 | −17 | −28 | −12 | −05 | −14 | −22 | 18 | 13 | −14 | 06 | 04 | 09 | −20 | 07 | −08 | −07 | 65 |
| 49 | 15 | −09 | 41 | 49 | 22 | −10 | 07 | −19 | −17 | −09 | −15 | −17 | −10 | 06 | 09 | −13 | 13 | −11 | 69 |
| 50 | 15 | −12 | −43 | −21 | −15 | 23 | 38 | 08 | −07 | −10 | −13 | −06 | 17 | −12 | 12 | −01 | −14 | 30 | 69 |
| 51 | 22 | −27 | 20 | 39 | 23 | −31 | 02 | 06 | 09 | 03 | −10 | −24 | −05 | 08 | 10 | −08 | −10 | −16 | 60 |
| 52 | 02 | −18 | 37 | 32 | 32 | 10 | −01 | −12 | −04 | −13 | 10 | −16 | 11 | 07 | −12 | −08 | −13 | 14 | 53 |
| 53 | 31 | −05 | 29 | 14 | −10 | −10 | 12 | 13 | 15 | 13 | 20 | 23 | 13 | 14 | 07 | 10 | −10 | 04 | 45 |
| 54 | 23 | 13 | 28 | 24 | 20 | −07 | −24 | −18 | −06 | 15 | 01 | 02 | 18 | −19 | 13 | −17 | 03 | 12 | 50 |
| 55 | 58 | 14 | −16 | 12 | −11 | −19 | 14 | −16 | −12 | −21 | 21 | −06 | −06 | 16 | 13 | 10 | −04 | 09 | 66 |
| 56 | 65 | −08 | −06 | −09 | −15 | −19 | 02 | 10 | 02 | 07 | −13 | −27 | 06 | −07 | 09 | −06 | −13 | 20 | 68 |
| 57 | 57 | 12 | −21 | 06 | −12 | −26 | −16 | −16 | −06 | −34 | 15 | 14 | −13 | −11 | 10 | 10 | 08 | 08 | 74 |
| 58 | 37 | −34 | −16 | 06 | −14 | −21 | −12 | −23 | −05 | 14 | −04 | −16 | 14 | −18 | −18 | −03 | 18 | 05 | 58 |
| 59 | 26 | 39 | −38 | 32 | −08 | −04 | 06 | 31 | 03 | 08 | −22 | 14 | 11 | −04 | 11 | −04 | 06 | −05 | 68 |
| 60 | 53 | 39 | −13 | 17 | −07 | 11 | −13 | 13 | 23 | −05 | −10 | −11 | −12 | −16 | −07 | 19 | 08 | −16 | 72 |
| 61 | 42 | 32 | −25 | 07 | −17 | −21 | −09 | 12 | 34 | −20 | −16 | 16 | −03 | 06 | 10 | 02 | −03 | 08 | 67 |
| 62 | 41 | 29 | −29 | 06 | −12 | −21 | −04 | −09 | 31 | 10 | −03 | −15 | 07 | −10 | 10 | −13 | 23 | −02 | 63 |
| 63 | 53 | 25 | −37 | 27 | −12 | 25 | −08 | 06 | −11 | 19 | 20 | −18 | 04 | 09 | −18 | 02 | 13 | −04 | 82 |
| 64 | 44 | 03 | −16 | 17 | −07 | 05 | 05 | −21 | −04 | 11 | −03 | 06 | 18 | 20 | −13 | −19 | −16 | 10 | 48 |
| 65 | 29 | 29 | −43 | 18 | −18 | 13 | −11 | 12 | −05 | 18 | 01 | 12 | 43 | 07 | −14 | −04 | −02 | −06 | 73 |
| 66 | 39 | 25 | −32 | 27 | −19 | 23 | 16 | −09 | −05 | 13 | 07 | 19 | −19 | 23 | 08 | 15 | 22 | −07 | 74 |
| 67 | 55 | 40 | −31 | 22 | −24 | 06 | 09 | 06 | 11 | 07 | 20 | 06 | −04 | 13 | 10 | −12 | 05 | −06 | 79 |
| 68 | 49 | 36 | −39 | 02 | 07 | −06 | −30 | 10 | −07 | −14 | 05 | −03 | 18 | −20 | 14 | 13 | 07 | 14 | 79 |
| 69 | 45 | 20 | −28 | −08 | −13 | −34 | −16 | 11 | −08 | 21 | 02 | −10 | −13 | 06 | 08 | −08 | 09 | −07 | 60 |
| 70 | 27 | −63 | −09 | 23 | −21 | 15 | −05 | 08 | −18 | 17 | −09 | 03 | −13 | −07 | 11 | −04 | 08 | −08 | 72 |

* Decimal points have been omitted.

TABLE 2

ROTATED FACTOR MATRIX*

| Test | G | A | M | I | N | S | T | D | C | R | O | Ag | Co | $C_1$ | $R_1$ | $R_2$ | $R_3$ | $R_4$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 47 | 06 | 10 | 23 | −04 | −07 | −27 | 08 | −14 | −03 | −01 | −24 | 08 | −06 | 10 | 09 | −03 | 08 |
| 2 | 42 | 26 | −01 | 00 | −10 | 08 | 01 | −21 | −16 | 10 | 02 | −21 | 00 | 18 | 18 | −16 | 09 | 06 |
| 3 | 44 | −05 | −17 | 17 | 24 | 09 | −05 | 03 | −14 | 46 | 12 | −12 | 02 | 00 | −17 | 05 | −09 | 02 |
| 4 | 37 | 04 | 20 | 07 | −19 | 13 | 02 | −12 | −17 | 08 | 07 | −02 | −18 | 05 | −20 | 34 | −09 | 05 |
| 5 | 18 | 21 | −10 | 12 | 16 | 18 | 18 | 00 | −11 | −08 | 10 | −13 | 13 | −22 | −26 | −01 | −08 | −27 |
| 6 | 07 | 49 | 08 | 41 | 09 | 26 | 06 | 17 | −07 | −06 | 07 | 16 | −08 | 04 | −08 | −23 | 17 | −03 |
| 7 | −07 | 74 | 16 | 09 | 25 | −05 | 09 | −18 | 06 | 24 | 06 | −07 | −04 | −01 | −05 | 22 | 18 | −19 |
| 8 | 16 | 46 | 25 | 22 | 37 | 02 | 02 | 01 | 13 | 04 | 17 | −06 | −05 | −09 | 29 | −08 | −03 | 05 |
| 9 | 29 | 48 | −02 | 16 | 14 | 48 | −05 | 12 | −01 | −06 | −03 | −17 | −08 | 21 | −14 | 01 | −06 | −24 |
| 10 | 07 | 40 | −01 | 43 | −05 | 29 | 14 | 15 | −01 | 12 | 08 | −01 | 01 | −10 | 06 | −11 | 01 | 18 |
| 11 | 03 | 17 | 60 | 13 | 15 | 09 | 01 | 30 | 01 | −08 | 18 | 00 | −08 | −02 | −05 | −29 | −13 | 06 |
| 12 | 20 | −10 | 39 | 08 | 12 | 02 | 13 | 17 | 16 | −05 | 25 | 01 | −15 | 32 | −08 | −11 | −17 | −07 |
| 13 | −01 | −03 | 72 | 14 | −06 | −03 | 04 | −05 | 28 | 20 | 07 | −01 | −05 | 15 | −21 | 05 | −03 | −05 |
| 14 | −08 | 04 | 64 | −08 | 04 | −26 | 06 | 26 | 16 | 22 | 18 | −06 | −08 | 00 | −23 | −04 | −09 | −09 |
| 15 | −21 | −03 | 45 | −13 | 17 | 12 | −13 | −08 | −15 | −02 | 12 | 11 | −03 | −08 | −12 | −21 | −28 | 02 |
| 16 | 01 | −01 | 48 | 14 | 06 | 08 | −10 | 28 | 02 | −08 | 12 | −01 | −08 | 13 | 30 | 30 | 25 | −26 |
| 17 | 44 | 13 | 09 | 44 | 11 | 05 | −12 | 17 | 20 | 21 | 06 | 10 | −05 | −02 | 08 | 25 | −17 | −01 |
| 18 | 38 | 31 | 25 | 34 | 09 | 15 | −04 | 20 | 17 | 01 | 30 | 02 | −01 | 06 | −02 | −23 | 14 | −14 |
| 19 | 34 | 23 | 03 | 45 | 10 | 11 | 07 | 26 | 08 | −07 | 30 | 02 | −23 | 21 | 05 | −11 | 15 | 06 |
| 20 | 28 | 22 | 02 | 43 | 12 | 12 | 03 | 09 | 19 | 26 | 23 | 29 | 09 | 27 | 16 | −20 | −05 | −14 |
| 21 | −01 | 27 | −12 | 64 | 02 | 12 | −07 | 01 | 23 | 10 | 10 | 27 | 13 | 11 | −17 | 00 | 00 | 03 |
| 22 | −28 | −03 | 13 | 30 | 40 | 06 | −03 | 29 | 12 | 27 | 30 | 12 | −05 | 22 | −12 | 11 | 09 | 23 |
| 23 | −17 | 05 | 03 | 33 | 42 | 23 | 12 | 27 | 24 | −07 | 21 | 01 | 18 | −06 | 01 | 12 | 19 | −09 |
| 24 | −04 | 05 | 16 | 22 | 69 | 01 | 06 | 15 | 07 | 12 | 18 | 18 | 20 | 40 | −05 | −03 | −04 | 05 |
| 25 | 14 | −14 | 10 | 15 | 40 | 14 | −06 | 17 | 20 | 05 | 07 | 39 | 28 | 20 | 01 | −13 | −17 | 23 |
| 26 | 11 | 07 | 00 | 20 | 44 | −02 | 10 | 37 | −07 | −08 | 03 | 10 | 23 | 07 | −02 | 15 | −21 | −31 |
| 27 | −03 | 29 | −11 | 17 | −07 | 45 | 08 | 14 | 24 | 28 | −16 | 40 | 01 | 00 | −06 | 10 | −07 | −09 |
| 28 | 12 | 51 | −09 | 06 | 27 | 59 | −11 | −01 | 14 | 07 | −01 | −13 | 11 | −02 | −06 | 00 | −07 | −03 |
| 29 | 09 | 29 | −02 | 46 | 24 | 43 | −02 | 08 | 20 | 13 | 33 | −15 | 06 | 10 | 01 | −05 | −03 | 00 |
| 30 | 18 | 49 | −30 | −07 | 18 | 53 | 10 | 13 | 09 | 07 | 21 | 11 | 03 | −01 | −12 | −10 | 17 | −06 |
| 31 | 10 | 44 | −23 | 27 | 16 | 47 | 11 | −01 | 18 | 09 | 26 | 26 | 00 | −08 | 14 | −08 | −08 | −03 |
| 32 | 22 | 14 | −12 | 19 | −20 | 40 | 11 | 10 | −23 | 24 | −17 | 02 | 06 | 24 | 06 | 07 | 24 | 11 |
| 33 | 26 | −04 | −02 | 15 | −07 | 77 | 10 | 15 | −10 | 25 | 03 | −11 | 01 | 01 | 01 | 19 | −10 | 18 |
| 34 | 23 | 10 | 07 | 03 | 29 | 02 | 45 | 30 | 16 | 02 | 12 | 15 | 13 | 20 | −15 | 11 | 08 | 07 |
| 35 | 07 | −15 | −05 | 03 | 29 | −04 | 69 | 13 | 12 | 11 | 05 | −07 | 19 | 04 | −01 | −20 | −17 | −07 |
| 36 | −11 | 08 | 03 | 03 | −11 | −12 | 47 | 11 | −05 | 09 | 04 | 12 | 02 | 02 | 09 | −03 | 07 | −02 |
| 37 | 12 | 20 | 09 | −01 | 36 | 11 | −04 | 59 | 02 | 08 | −04 | 06 | 15 | 21 | 00 | −12 | 17 | 18 |
| 38 | −23 | −11 | 15 | 19 | 22 | 10 | 20 | 56 | 15 | 10 | 40 | −02 | 08 | −01 | 00 | 22 | 05 | −12 |
| 39 | −05 | 00 | −06 | 10 | 23 | 20 | 03 | 49 | 11 | 41 | −17 | 09 | −03 | 27 | 07 | −24 | 06 | −29 |
| 40 | 08 | 19 | 02 | 10 | 06 | 02 | 32 | 36 | 25 | 06 | 20 | 25 | 11 | 34 | 10 | −09 | −31 | 06 |
| 41 | 12 | 08 | 02 | 14 | 15 | 08 | 08 | 57 | 22 | 06 | 16 | 09 | 22 | 23 | −17 | 04 | −07 | −17 |
| 42 | −17 | 22 | −09 | 34 | 07 | 14 | 11 | 28 | 13 | 00 | 35 | −03 | 25 | 32 | −06 | −04 | −15 | −24 |
| 43 | 13 | 14 | 03 | −02 | 17 | 15 | −01 | 50 | 30 | 23 | 03 | 16 | 09 | 44 | −14 | 23 | −04 | −02 |
| 44 | 00 | −10 | 52 | 22 | 05 | 10 | 14 | 11 | 44 | −17 | 06 | 15 | −01 | 28 | −05 | −09 | 14 | 02 |
| 45 | −07 | 00 | 12 | 07 | 13 | 05 | 08 | 50 | 48 | −22 | 22 | 08 | 03 | 08 | −13 | 20 | 14 | −12 |
| 46 | −15 | 01 | 07 | 31 | −08 | −09 | −16 | 08 | 43 | 01 | −07 | −01 | 27 | 29 | 15 | −22 | 08 | −08 |
| 47 | 16 | −03 | −02 | 19 | 36 | 17 | 28 | 14 | 20 | −11 | 20 | 02 | 14 | 51 | 04 | 22 | 11 | −29 |
| 48 | 27 | 16 | 07 | 25 | 16 | −10 | 33 | 22 | 39 | −17 | 22 | 18 | 09 | 12 | 06 | 06 | −07 | 05 |
| 49 | 07 | −11 | 14 | 19 | −01 | 22 | 18 | 04 | −24 | 60 | 13 | −08 | −10 | −24 | −08 | −15 | 15 | −02 |
| 50 | −35 | −06 | 12 | 05 | −06 | −06 | −05 | 04 | 19 | −09 | 01 | 13 | 04 | 62 | 25 | −08 | −08 | 09 |
| 51 | −08 | −02 | 19 | 13 | 17 | 05 | 25 | 02 | −14 | 48 | 19 | 13 | −21 | −25 | 02 | 20 | 04 | −12 |
| 52 | 02 | 00 | 06 | 04 | 02 | 14 | 04 | 13 | −19 | 50 | 05 | −33 | −09 | −08 | −03 | 14 | −18 | 18 |
| 53 | 05 | 33 | 18 | 27 | 00 | 20 | 02 | 14 | −22 | −01 | 04 | 08 | 05 | 00 | 04 | 35 | 08 | 01 |
| 54 | 26 | 09 | −02 | −11 | −07 | 28 | 12 | 10 | −21 | 29 | 35 | −08 | 16 | −04 | 05 | 02 | −06 | −15 |
| 55 | −18 | 09 | 08 | 52 | 16 | 02 | 07 | 05 | −04 | 10 | 31 | 14 | 37 | 17 | −18 | −04 | 00 | −01 |
| 56 | −08 | 28 | 14 | 19 | 27 | 12 | 15 | −04 | 23 | 16 | 42 | 27 | 04 | 28 | 17 | 04 | −03 | −05 |
| 57 | −02 | 05 | 06 | 35 | 17 | −02 | −07 | 20 | −04 | −10 | 54 | 22 | 27 | 07 | −20 | −18 | −06 | −07 |
| 58 | 09 | 03 | 28 | 02 | −03 | −13 | 13 | 08 | 35 | 13 | 53 | 01 | 07 | 01 | 07 | 05 | 16 | 05 |
| 59 | −19 | −03 | 01 | −10 | −02 | 17 | 04 | 10 | −09 | −05 | 03 | 61 | 30 | −04 | 17 | −09 | 05 | −03 |
| 60 | 15 | 11 | −11 | 12 | 08 | 11 | −08 | 16 | 23 | 13 | 10 | 62 | 25 | −05 | −19 | −06 | −10 | 01 |
| 61 | 03 | 03 | −14 | 25 | 22 | 02 | −01 | 13 | −13 | −17 | 26 | 59 | 19 | 03 | 10 | −01 | −09 | 06 |
| 62 | 15 | −12 | −16 | 15 | 09 | 01 | 01 | 00 | 16 | 06 | 36 | 45 | 34 | 06 | 15 | 10 | 14 | −14 |
| 63 | −01 | 04 | 18 | 03 | 10 | 14 | 01 | 05 | 34 | 16 | 04 | 29 | 69 | 03 | −13 | 05 | 00 | 13 |
| 64 | 03 | −01 | 20 | 22 | 03 | 11 | 30 | 12 | 07 | 04 | 16 | 04 | 38 | 09 | 22 | 06 | −13 | 18 |
| 65 | −05 | 13 | 12 | −12 | −09 | −03 | 05 | 18 | 13 | −08 | 01 | 30 | 66 | −03 | 27 | 03 | −10 | 08 |
| 66 | 06 | −12 | 20 | 26 | −04 | 13 | 12 | 05 | 02 | −06 | −12 | 37 | 53 | 14 | −25 | −07 | 21 | 13 |
| 67 | 02 | −04 | 10 | 32 | 13 | 23 | −04 | 01 | 04 | −07 | 07 | 45 | 62 | 07 | 01 | 09 | 01 | −04 |
| 68 | −08 | 16 | −15 | −12 | 15 | −02 | −08 | 22 | 04 | 05 | 39 | 36 | 49 | 19 | −11 | −15 | −15 | −13 |
| 69 | −05 | 12 | 00 | 08 | 33 | 06 | 18 | −13 | 19 | −12 | 31 | 31 | 35 | −06 | −01 | −02 | 16 | −22 |
| 70 | 05 | −02 | 77 | −07 | 05 | 00 | 08 | 00 | 12 | 09 | 12 | 10 | −13 | 09 | −07 | −03 | 15 | 00 |

* Decimal points have been omitted.

bring out this fact. Thus, in the first list, for Factor G, there are three tests also loaded on Factor I and two on Factor O. The probable meaning of these systematic relationships will be discussed in connection with each factor.

In general, where such parallel significant loadings occur in two factors we may attribute them to one or another of two reasons. One possible reason is that tests intended to measure one factor include items that also indicate the other factor. This could be the sole reason, the correlation between the factors being zero. Another possible reason is that the two factors are actually correlated. Sometimes both of these reasons apply. We shall attempt to decide when either impure tests or correlated factors are involved. More often than not, we shall find that even when two or more tests have significant loadings on a pair of factors, other tests have zero, or near zero, loadings on the one factor and not on the other. This may be taken to indicate that the psychological factors are orthogonal.

In other words, *common significant loadings in two or more tests is not sufficient evidence for correlation between factors.* We must often look to what we regard as insignificant loadings to provide the indications of correlation. If none of the tests with significant loadings on a factor has a zero loading on some other factor, the two factors may be correlated. For example, Tests 1–4 have significant loadings on Factor G (see Table 2) and their loadings on Factor $C_1$ are −.14, −.16, −.14, and −.17, respectively. Although all these loadings on $C_1$ are insignificant, and even quite small, by their unanimity they indicate that axis G should be rotated further away from $C_1$ to the extent of about 21 degrees. The angular separation of axes G and $C_1$ is then 111 degrees. The cosine of 111 is −.36, which indicates a correlation of −.36 between Factors G and $C_1$.

We shall use this rough method to obtain some idea of the amount of correlation between pairs of factors, starting from the orthogonal solution. Since the number of apparently nonzero correlations is very small (of the 105 pairs of factors, some 15 seem to be correlated more than .10), this method will serve fairly well. For more complete and accurate estimates, an oblique rotational solution would be needed. We have previously expressed some reservations concerning estimates of factor intercorrelations derived from oblique rotations. The same reservations apply to some extent to our own estimates. The chief reason is that when complete orthogonality between two factors does not occur, this may be due to our inability to prepare the appropriate tests, each as free as possible from variance in the other factor.

Tests 1–5 were composed of items scored for G. Tests 1–4 appear in this list as expected, but Test 5 (Quickness) has a loading of only .18. Thus, the quick-acting

G. General Activity

| Test No. | Test title | Loadings in the Factor | Loadings in Other Factors |
|---|---|---|---|
| 1 | Rapid Pace | .47 | |
| 3 | Energy | .44 | (R −.36) |
| 17 | Personal Strengths and Weaknesses | .44 | (I .44) |
| 2 | Drive for Activity | .42 | |
| 18 | Feeling of Adequacy | .38 | (I .36) (O .30) |
| 4 | Liking for Action | .37 | |
| 50 | Impulsiveness | .35 | ($C_2$ .62) |
| 19 | Self Confidence vs. Inferiority | .34 | (I .45) (O .30) |

aspect of this factor seems to drop out in this analysis, leaving the other four qualities to define it. Of Tests 1–4, only Test 3 has a significant loading on any other factor, which indicates the relative uniqueness of those score variables. As expected from the relatively low intercorrelations of scores for the G variables, none proved to have more than moderate loading on G.

Tests 17–19, designed for Factor I (*confidence vs. inferiority feeling*), have significant loadings on G. Test 17 is correlated with G probably because three of its seven items make reference to good health and physical strength. While Tests 18 and 19 have no items that give any direct clue to their loadings on G, some of their items may relate indirectly to health and strength, e.g., playing best against a superior opponent. In general, for some examinees, confidence for meeting life's competitions may well imply general drive and physical fitness.

From this line of thinking we find a logical basis for a genuine correlation between G and I. The relationship indicated by the data, however, seems to be a one-sided one, with significant loadings on G for the I tests but no significant loadings on I for the G tests. We must also consider the fact that in addition to the three G tests with near-zero loadings on I, there is one I test with a zero loading on G. From these last facts we conclude that the factors are probably orthogonal.

A possible relation of G to Factor O (*objectivity*) is suggested by weak loadings for both in Tests 18 and 19, but tests of G uniformly have close to zero loadings on Factor O, and tests of O have almost zero loadings on G. Thus, O and G should be regarded as independent.

When explaining the method used to estimate a correlation between two factors above, we used Factors G and $C_1$ as an example. It was concluded that the correlation between G and $C_1$ is about $-.36$. Factor $C_1$ is interpreted in this analysis as being *emotionality*. Another possible name for it is "emotional immaturity." Since the loadings of tests on this factor in Table 2 relate to the opposite pole, the negative sign for the correlation of .36 means that the greater the activity level or drive level of the individual the greater his emotionality or emotional immaturity. The negative correlation is with emotional maturity. This correlation fits nicely with the activation hypothesis of emotion in general. To some extent, freedom from emotion may mean low drive for physical activity.

The only other factor with which G seems to have appreciable correlation is Ag (*agreeableness*). The correlation indicated is approximately $-.40$. An active person is more likely to be low on Ag, i.e., to have resentments and hostilities, and also contempt and disregard for others. A more agreeable, compliant, friendly person is a less active person. It has been observed clinically that persons with low Ag score are much more likely to cause overt trouble if also high in G. Apparently a person's lowness on Ag is also limited by his lowness on G.

The leading test in this list (Maintaining One's Rights) suggests that Factor A is psychologically a socially approved form of aggressiveness or self-assertiveness. It is not the aggressiveness born of frustration. To this extent, as well as for other reasons, the frustration-aggression hypothesis has serious limitations. While there may be an element of frustration involved when a person has to maintain his rights, as indicated by Test 7, other tests of Factor A do not imply this element. The aggression involved in the exhibition of Factor A is of a nonpunitive kind. The other unique test in the list (8, Self Defense) also seems to emphasize the defensive aspect of this fac-

A. Ascendance vs. Submission

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Maintaining One's Rights | .74 | | | | | |
| 28 | Social Leadership | .51 | (S | .59) | | | |
| 6 | Being Conspicuous | .49 | | | (I | .41) | |
| 30 | Liking for the Limelight | .49 | (S | .53) | | | (M .30) |
| 9 | Social Initiative | .48 | (S | .48) | | | |
| 8 | Self Defense | .46 | | | | | (X .37) |
| 31 | Shyness, Bashfulness | −.44 | (S | −.47) | | | |
| 10 | Fear of Social Contacts | −.40 | | | (I | −.43) | |
| 53 | Reticence | −.33 | | | | | |

tor, but other tests, such as 6, 9, and 28, present more positive qualities.

There is much suggestion of correlation between Factors A and S (*sociability*) in the list above. Three of the seven tests designed for S have significant loadings on A, and one more (27, Liking for Friends and Acquaintances) just barely misses. The title of Test 28 (Social Leadership) immediately implies some degree of self-assertion. Items in Test 27 make no direct statement regarding taking the initiative, but getting acquainted and making friends is undoubtedly easier where some initiative is shown. Tests 30 and 31 contain items that are in some ways parallel to items in Test 6. Only one of the A tests (9, Social Initiative) has a significant loading on S, but Test 10 (Fear of Social Contacts) barely misses.

In spite of all these secondary relationships, four of the A and S tests have essentially zero loadings on the other factor. Tests 7 and 8 have zero loadings on S, and Tests 32 and 33 have zero or near-zero loadings on A. Thus, the factors are probably orthogonal. In distinguishing between Factors A and S psychologically, Tests 7 and 8 should accordingly be given most weight for A, and Tests 32 and 33 for S.

From the standpoint of methodology, we have here a striking example of how impure tests can give the erroneous appearance of correlated factors. If either Tests 7 and 8 or 32 and 33 had been absent from the analysis, the conclusion would have been that the factors *are* correlated. This kind of outcome probably occurs on many other occasions in which there is also actually much less correlation between the psychological factors than appears.

Another apparent factor correlation must be examined. Two A tests have second loadings on Factor I (*confidence*). Items in Test 6 make no direct reference to confidence, but actions suggested in two of them would seem to require it, e.g., "Do you usually speak out in meeting to oppose some one who you feel sure is wrong?" All the items in Test 10 refer to actions for which a feeling of confidence would be needed or would be desirable; actions such as soliciting funds, selling, making application in person, and "having it out" with a critic. The nature of items in Tests 6 and 10 thus seems to account for their loadings on Factor I. There is other evidence of correlation, however.

Although one A test has a near-zero loading on I, and vice versa, a plot of the significantly loaded tests on axes A and I shows that each axis could well be rotated slightly toward the other. The net result is a separation of 65 degrees, indicating a correlation of +.42. It may be that better item writing would succeed in reducing this correlation. This remains to be seen. On the other hand, a linking of self-confidence and self-assertiveness is logical.

Tests 11–16 and variable 70 were designed as measures of Factor M, and all have significant loadings on it. The three leading variables being what they are,

## M. Masculinity vs. Femininity

| | | |
|---|---|---|
| 70 | Male Sex Membership | .77 |
| 13 | Masculine Vocational Interests | .72 |
| 14 | Masculine Avocational Interests | .64 |
| 11 | Fearfulness | −.60 (D .30) |
| 44 | Emotional Excitability | −.52 ($C_1$ .44) |
| 16 | Sympathy | −.48 |
| 15 | Disgustfulness | −.45 |
| 12 | Inhibition of Emotional Expression | .39 ($C_2$ −.32) |
| 30 | Liking for the Limelight | −.30 (A .49) (S .35) |

there can be no doubt regarding its identity.

It might be surprising that more of the variables not designed primarily for M show no relationship to this factor, for any variable in which there is an appreciable sex difference should normally be expected to correlate with this factor. The reason for this will become apparent later. Briefly, the sex differences in other variables tended to be systematically confined to tests of certain factors—S, O, and Co, in particular. These relationships are accounted for in terms of small correlations of M with these factors.

Only two isolated non-M variables have significant loadings on the factor: 44 (Emotional Excitability) and 30 (Liking for the Limelight). Items or total scores indicating emotional expressiveness or excitability have previously correlated negatively with masculinity. How much this may be due to reluctance on the part of the male to admit emotionality and how much is genuine sex difference in emotionality we do not know. Two M tests, 11 (Fearfulness) and 16 (Sympathy) have loadings of .30 and .28, respectively, on Factor D. There are not enough systematic relationships between M tests and C and D tests to indicate intercorrelations of M with those factors.

It is difficult to make an accurate estimate of the correlation between Factors M and S (*sociability*). It might be as small as −.24 and as high as −.44. The loading of −.30 on Test 30 (Liking for the Limelight) may be inflated somewhat by overmodesty on the part of the males in responding to this kind of item or reluctance to admit as much exhibitionism as they feel. The males may also be overrating their bashfulness or shyness, which they indicate to the extent of a loading of −.23 on M for Test 31 (Shyness, Bashfulness). Discounting the loadings on these two tests, the correlation between M and S may be nearer to −.24 than −.44.

The correlation between M and O (*objectivity*) could be anywhere between zero and .52, depending upon where one prefers to draw the axes. Whatever the correlation, it is positive rather than negative. That is, the more masculine the person, the more objectivity, a conclusion that males would be quite prepared to accept. On the other side of the picture, females are more hypersensitive and inclined to take things personally. If the factors are not actually correlated, it will take much revision in item writing for both to eliminate sex differences in O items and to eliminate O variance in the M items. The chances are that the factors are positively correlated to some degree.

The correlation between M and Co (*cooperativeness*) is much more clearly estimated to be about −.12. From this fact the implication is that males are slightly more inclined to be fault-finding and complaining than females. The correlation is so small, however, as to be of little consequence.

Something should be said regarding the

unique status of Factor M. Comparatively speaking, it is not a stable, unitary variable. An M factor is defined in any particular analysis by the experimental variables in which there are substantial sex differences. Thus, it may be expected that a masculinity-femininity factor will differ from one analysis to another, depending upon which M-factor indicators are present. One implication of this fact is that the correlation of M with other factors will differ from one analysis to another.

Another implication of practical importance is that the nature of MF scores obtained from published tests will vary. Such a score is obtained from the *Minnesota Multiphasic Personality Inventory*, the *Terman-Miles Attitudes-Interests Analysis Test*, and the *Strong Interest Blank*, as well as from *Inventory of Factors GAMIN* and the *Guilford-Zimmerman Temperament Survey*. It can be predicted that MF scores from different tests will not intercorrelate as high as might be expected of reliable scores of the same factor. The *MMPI* MF score would presumably be weighted relatively more by sex differences in pathological symptoms. The M scores in the authors' inventories are weighted relatively more heavily in terms of interests and certain emotional qualities. The Terman-Miles MF score would involve the same variables plus additional ones derived from inkblot and word-association tests. In the interpretation of any MF score, therefore, it is important to keep in mind the areas of sex differences represented.

Tests 17–21 were designed to measure Factor I. All appear in the list above, along with twice as many others that were not so designed. Let us consider first the properties of this factor as indicated by its largest loadings.

The leading variable (Feeling of Acceptance), with no significant secondary variance, indicates that this factor is best defined as a feeling of acceptance and security in social relations. The appearance of variable 55 (Egocentrism), with negative loading, was unexpected, since it was designed as a measure of Factor O (*objectivity*). Two of the eight items in that test touch upon inferiority feelings in a projective manner: "Are you continually comparing yourself with other people?" and "Are you as quick as other people to pay compliments where they are deserved?" But it would hardly seem that this small proportion of items alone would swing the Egocentrism score so far toward I. As we shall see, there is a small correlation between I and O, and hence some basis for accepting an egocentric aspect to Factor I. On the basis of clinical observations, too, we should expect self-centeredness to be an

I. Confidence vs. Inferiority Feelings

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 21 | Feeling of Acceptance | .64 | | | | | | | |
| 55 | Egocentrism | −.52 | (O | −.31) | | | (Co | −.37) | |
| 29 | Social Poise | .46 | (O | .33) | (S | .43) | | | |
| 19 | Self Confidence vs. Inferiority | .45 | (O | .30) | (G | .34) | | | |
| 17 | Personal Strengths and Weaknesses | .44 | | | (G | .44) | | | |
| 20 | Discontent with Status | −.43 | | | | | | | |
| 10 | Fear of Social Contacts | −.43 | | | | | (A | −.40) | |
| 6 | Being Conspicuous | .41 | | | | | (A | .49) | |
| 57 | Ideas of Reference | −.35 | (O | −.54) | | | | | |
| 18 | Feeling of Adequacy | .34 | (O | .30) | (G | .38) | | | |
| 42 | Feelings of Guilt | −.34 | | | | | ($C_2$ | .32) | |
| 23 | Restlessness | −.33 | | | (N | −.42) | | | |
| 67 | Suspiciousness of Hypocrisy | −.32 | | | (Co | −.62) | (Ag | −.45) | |
| 46 | Emotional Immaturity | −.31 | | | | | ($C_1$ | .43) | |
| 22 | Tense-excited vs. Calm-relaxed | −.30 | (O | −.30) | (N | −.40) | | | |

aspect of inferiority feelings. The mechanisms relating confident behavior to acceptance and security on the one hand and to absence of egocentrism on the other are common clinical conceptions.

The long list of non-I tests significantly related to Factor I and the many significant secondary loadings for I tests suggest that there are many real linkages between I and other factors. In general, this is true, but there are other things to be considered.

There is many an opportunity for non-I score variables to be loaded on I because of the peculiar psychological status of this factor. Many an item in non-I tests pertains to quality or to behavior that has implications of strength or weakness on the part of the examinee. If he gives himself the benefit of the doubt on such items and does it systematically, and if, as is probable, some tests feature this kind of item more than others, correlations with I will be generated. If most or all of the tests for a certain non-I factor are of this kind, a correlation between that factor and I will be indicated. If only a few of the tests for a non-I factor are so affected, the factors can still be uncorrelated, but only these few tests will be loaded on the factor. Tests in the list above that seem to fall in this category are 42 (Feelings of Guilt), 67 (Suspiciousness of Hypocrisy), and 46 (Emotional Immaturity). The significant loadings on I for these tests have no implications for correlations of factors. The systematic relation of three G tests to I was discussed before, and the conclusion was that the Factors G and I are uncorrelated.

The correlation of I with Factor A was reported earlier to be +.42. I also seems to correlate to smaller degrees with Factors N, S, $C_1$, and O, the coefficients being +.31, +.16, −.31, and +.12, respectively. All these coefficients seem to be fairly accurately estimated, and, of course, are a function of this particular test battery. If the significant loadings would suggest correlations stronger than these figures suggest, the fault is with the tests themselves. The interpretation of these correlations would be that the confident person is inclined to be calm and composed, sociable, emotionally mature or emotion-free, and objective. With feelings of inferiority go nervousness, seclusiveness, emotional immaturity, and hypersensitiveness. Few would doubt the reasonableness of these relationships.

Variables 22–26 all lead in the list of tests related significantly to Factor N. Because they were designed for N, and because the term "nervousness" appears in the name of the leading variable, this factor has been well named. The tense vs. calm aspect, however, is not as strong as in previous results, the loading in Variable 22 (Tense-excited vs. Calm-relaxed) being only −.40.

Because of paired, significant, secondary loadings on I, D, O, Ag, and $C_2$, we should

N. CALMNESS, COMPOSURE VS. NERVOUSNESS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24 | Nervousness and Jumpiness | −.69 | ($C_2$ | .40) | | | | |
| 26 | Fatigueability | −.44 | | | (D | .37) | | |
| 23 | Restlessness | −.42 | | | | | (I | −.33) |
| 22 | Tense-excited vs. Calm-relaxed | −.40 | | | (O | −.30) | (I | −.30) |
| 25 | Annoyance and Irritability | −.40 | | | | | (Ag | −.39) |
| 8 | Self Defense | .37 | | | (A | .46) | | |
| 37 | Emotional Depression | −.36 | | | (D | .59) | | |
| 47 | Absentmindedness | −.36 | ($C_2$ | .50) | | | | |
| 68 | Victim of Hard Luck | −.33 | (Co | −.35) | (O | −.30) | (Ag | −.31) |

consider possible relations of N to those factors. The correlation of .31 between N and I has already been mentioned. The plots in planes involving N and each of the others in turn indicate essentially orthogonal relationships except between N and D.

The other apparent relationships can probably be accounted for in terms of impure tests. The two tests having Ag variance as well as I variance, for example, contain some telltale items. Some of the items in Test 25 (Annoyance and Irritability) probably pertain to things that arouse the ire of persons who are predisposed to be belligerent (low on Ag). They refer to "piling on" work, telling the driver how to drive, crowding ahead in line, and "people who hurry you." Test 69 (Victim of Hard Luck) divides its common-factor variance about equally among four factors. It has no obvious references to composure or to nervousness to account for the significant loading on N. Three of the much stronger Ag tests, however, have zero loadings on N and four other tests with significant loadings on N have essentially zero loadings on Ag. Thus, orthogonality for N and Ag is fairly well indicated.

The correlation between N and D is estimated to be −.44, with a possibility that it is nearer zero than that. The negative sign means that depression goes with nervousness, and cheerfulness goes with calmness and composure. We can say that the direction of the correlation is clearly indicated and that it is psychologically reasonable. The degree of correlation is still in doubt.

Seven tests, 27 through 33, were designed to measure sociability and all seven of them are in the list above. There is only one test in the list that was not designed for this factor—the A variable, Social Initiative.

The two variables without significant secondary loadings here are 33 (Liking for Social Affairs) and 32 (Gregariousness), the former leading all the other variables by a substantial margin. These relatively pure tests suggest that the factor should be defined as social interest. The other S variables support this definition indirectly, but after eliminating their A components they leave something that should be considered toward the defining of S. They suggest a somewhat broader definition than social interest and justify the more general term "sociability." The opposite pole would be seclusiveness, not just lack of social interest.

From the significant secondary loadings, the only factor with which S seems correlated is A. In earlier discussion it was pointed out that this is only an apparent correlation. It is all too obvious that too many S tests are impure, leaning heavily toward Factor A.

Although not apparent in the table above, there is a correlation of S with M, which has been noted in the discussion of the latter factor. The estimate was between −.24 and −.44. We also find a correlation of −.21 between S and R. This indicates that the social person is likely to be on the happy-go-lucky, carefree side of R and that the restrained person is likely

S. SOCIABILITY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 33 | Liking for Social Affairs | .77 | | | | | | | |
| 28 | Social Leadership | .59 | (A | .51) | | | | | |
| 30 | Liking for the Limelight | .53 | (A | .40) | | | (M | .30) | |
| 0 | Social Initiative | .48 | (A | .48) | | | | | |
| 31 | Shyness, Bashfulness | −.47 | (A | −.44) | | | | | |
| 27 | Liking for Friends and Acquaintances | .45 | | | (Ag | .40) | | | |
| 29 | Social Poise | .43 | | | (I | .46) | (O | .33) | |
| 32 | Gregariousness | .40 | | | | | | | |

to be less sociable. Thus are the introvert and extravert poles of these two dimensions found to be in the alignment that should be expected.

With seven a priori tests of S in the analysis, we should not have been greatly surprised to find them separating into two or more groups. Layman (10), for example, found four factors in the social area: "social initiative," "gregariousness," "social inadequacy," and "social aggressiveness." The last may be aligned with our Factor A. In some respects her factor "Social inadequacy" resembles our Factor I, but Layman also reported another factor "feeling of inferiority," which comes closer. Mosier reported another social factor "platform shyness" (12), which has no counterpart in our analysis, but which may be related to the negative pole of Factor A.

In our analysis there seemed to be sufficient opportunity for "social initiative" to separate from S, as well as from A. It is doubtful whether "platform shyness" could have done so, although this, too, was a possibility. Both Layman and Mosier analyzed single items whereas we analyzed scores from groups of items. It is possible that in our groupings we have submerged one or two social factors. Only further analyses will clear up this matter.

T. REFLECTIVENESS

| | | | | | |
|---|---|---|---|---|---|
| 35 | Liking for Serious Thinking | .69 | | | |
| 36 | Analysis of Self and Others | .47 | | | |
| 34 | Meditativeness | .45 | (D .30) | | |
| 48 | Daydreaming | .33 | | ($C_1$ −.39) | |
| 40 | Loneliness | .32 | (D .36) | | ($C_2$ .34) |

The three variables designed to measure Factor T (34–36) lead this list. So far as our present information goes, we have little basis for suggesting any important change in this factor. It emphasizes a liking for reflective and meditative thinking, which does not preclude a liking for or indulgence in daydreaming.

We are unable to say whether this factor is distinct from a factor called "interest in thinking" found in a comprehensive analysis of interests (4) and also distinct from another factor called "autistic thinking" in the same analysis. Factor T does not seem to be an interest in thinking that is as rigorous or logical as in the former instance or as wishful as in the latter instance. Until there is evidence to the contrary, it is safe to conclude that T is not the same as either of those factors. It is clearly in line with what French (1) calls "interest in philosophizing." It may be suggested that these factors represent attitudes toward three somewhat different kinds of thinking and that there may be still other such thinking-attitude factors that have much to do with intellectual functioning.

In the list of significant loadings above, there is no indication of correlation between T and any other factor. Examination of Table 2, however, and a plotting of pertinent loadings, show that a correlation of about +.21 is called for between T and D. The estimate seems to be rather clearly determined. There is thus a probable connection between interest in reflective thinking and depression and between cheerfulness and lack of interest in reflection or meditation.

Of the six D variables, 37–42, five are significantly related to Factor D. The sixth test, 42 (Feelings of Guilt) has a loading of .28, but it has three slightly higher loadings on other factors (I, O, and $C_2$). From clinical observations we might well expect a more substantial relation between guilt feelings and depression. This result suggests that the connection is more pathological than normal. The presence of the qualities of depression, worry, and lack of cheerfulness high in the list, however, indicates that the factor is well named.

French (1) prefers to name this factor "loneliness" because in Mosier's analysis (12) items on loneliness were more or-

D. DEPRESSION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 37 | Emotional Depression | .50 | (N | −.36) | | | |
| 41 | Physical Depletion | .57 | | | | | |
| 38 | Worry, Anxiety | .56 | | | (O | −.40) | |
| 43 | Emotional Fluctuations | .50 | | | ($C_1$ | .30) | |
| 45 | Emotional Perseveration | .50 | | | ($C_1$ | .48) | |
| 39 | Cheerfulness | −.49 | | | | | (R −.41) |
| 26 | Fatigueability | .37 | (N | −.44) | | | |
| 40 | Loneliness | .36 | | | ($C_1$ | .34) | (T .32) |
| 11 | Fearfulness | .30 | | | | | (M −.60) |
| 34 | Meditativeness | .30 | | | | | (T .45) |

thogonal to the "cycloid-disposition" factor than were the more obviously depression items. In our analysis, however, the test Loneliness divided its common-factor variance among three factors—D, $C_1$, and T.

The variables intended for Factor C in this analysis divided into two groups so that a clear-cut cycloid-disposition factor did not materialize. Instead, we have Factors $C_1$ and $C_2$, to be discussed later. It can be noted here that most of the D tests have low or zero projections on both $C_1$ and $C_2$, indicating that the more strongly loaded depression tests are almost orthogonal to those two factors.

Two of the C tests, however, had their highest loadings on Factor D: 43 (Emotional Fluctuations) and 45 (Emotional Perseverations). The former would ordinarily be expected to define best the cycloid-disposition factor. The presence of these two variables in the D list illustrates one important reason for the high intercorrelation of factor scores for D and C in inventory STDCR.

Actual correlations between D and other factors have been mentioned earlier. There are two: a correlation of −.44 with Factor N and a correlation of +.21 with Factor T.

Of the six C variables, five have significant loadings on Factor $C_1$. But we have the curious result, mentioned above, that Test 43 (Emotional Fluctuations) no longer heads the list. In fact, it is at the bottom of the list and just over the line of significance. Its largest loading (.50) is on D and its next largest (.44) is on $C_2$. Although Factor $C_1$ seems close to the former Factor C, it lacks Factor C's distinctive cycloid character. It is true that two of the five items in Test 43 do not refer directly to emotions. They read: "Are there times when your mind seems to work very slowly and other times when it works very rapidly?" and "Are you sometimes bubbling with energy and sometimes very sluggish?" The other three items, however, very pointedly refer to fluctuations of mood.

From the nature of Test 46, particularly, but also to some extent Tests 44 and 45, one might be prompted to call this factor "emotional immaturity." French (1) lists such a factor, separate from the cycloid factor. Items in Test 46 rather obviously suggest emotional immaturity; for example: "Do you work much better when you are praised?" "When failing to have your own way, do you often resort to re-

$C_1$. EMOTIONALITY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 45 | Emotional Perseveration | .48 | (D | .50) | | | | |
| 44 | Emotional Excitability | .44 | | | (M | −.52) | | |
| 46 | Emotional Immaturity | .43 | | | | | (I | −.32) |
| 48 | Daydreaming | .39 | | | (T | .33) | | |
| 58 | Unwarranted Sympathy | .35 | (O | −.53) | | | | |
| 63 | Faultfinding with Human Nature | .34 | | | (Co | −.69) | | |
| 43 | Emotional Fluctuations | .30 | (D | .50) | | | ($C_2$ | .44) |

sentful thinking?" and "Does it upset you much to lose in a competitive game?" The items seem to contain a "spoiled-child" core. This is not so true of items in Tests 44 and 45. Examples from Test 44 are: "Do you 'get rattled' easily at critical moments?" and "Is your own mood very easily influenced by people around you, that is, by happy people or sad people?" Examples from Test 45 are: "Do you spend much time in thinking over good times you have had in the past?" and "Have you ever been bothered by having a useless thought come into your mind repeatedly?" Variables other than 44–46 contribute still other qualitative aspects to the picture. Hence, until more is known about this factor, we propose to call it by the very general term "emotionality."

In the general area of Factors D and C it looks as if we need to resort once more to the analysis of individual items. Anyone who attempts to group items homogeneously in this area is likely to encounter many difficulties. If the grouping is inadequate, the resulting factor structure is likely to be clouded, if not distorted. While Factor D in this analysis seems to be reasonably well determined, the solution with respect to C is somewhat out of line with previous findings. Perhaps, indeed, the cycloid factor as previously found should break up along the lines found here. Our conclusions in the region of Factor C must be somewhat indeterminate.

Factor $C_1$ seems to correlate with four other factors. Since there are so many, none can be so accurately estimated by our single-plane method. It was reported earlier that $C_1$ correlates $+.36$ with Factor G and $-.31$ with Factor I. The estimate of the correlation with R is as high as $-.70$. This means that the person with self-restraint is very likely to be also emotionally mature. The happy-go-lucky, carefree person is likely to be emotionally immature. There can be little argument about the reasonableness of the direction of this correlation. It was a surprise to find the estimate so high, since correlations between scores for C and R in Inventory STDCR have been very low. This may mean that, after all, the location of Factor $C_1$ is quite different from that of the former Factor C.

Factor $C_1$ shows some positive correlation with $C_2$, which has not been named, but which seems to be a kind of emotional instability. The estimate of the correlation is uncertain. It is tentatively reported as $+.28$ but may be as high as $+.40$. We should have expected more in common between these two factors than between $C_1$ and R.

Only three of the six tests included to measure R held together to define this factor—Tests 49, 51, and 52. The greatest change from previous findings was that Variable 50 (Impulsiveness) vanished completely from the list, with its variance transferring mainly to Factor $C_2$. That it would not hang together with the other R tests was apparent from the intercorrelations. This separation might have been anticipated, for the French summary (1) gives an impulsiveness factor separate and distinct from R (which he lists as rhathymia). Whether our factor $C_2$ qualifies as impulsiveness, however, is another question, which will be discussed later.

R. RESTRAINT VS. RHATHYMIA

| | | | | |
|---|---|---|---|---|
| 49 | Carefreeness vs. Restraint | −.60 | | |
| 52 | Liking for Action and Excitement | −.50 | | (Ag −.33) |
| 51 | Seriousness vs. Unconcern | .48 | | |
| 30 | Cheerfulness | −.41 | (D −.49) | |
| 3 | Energy | −.36 | (G .44) | |

Other variables that failed to represent R as expected include 53 (Reticence), which we found related to Factor A, and 54 (Rapport with the Environment), which just barely misses a significant loading on R and which has a small loading (.35) on Factor O. The relation of Test 53 (Reticence) to Factor A can probably be accounted for by its two items, which read: "Are you inclined to keep your opinions to yourself during group discussions (not class discussions)?" and "Do you dislike to talk about yourself, even to close friends?" As a matter of fact, neither item necessarily pertains to talkativeness, which *is* sometimes found loaded on R.

We should have expected the test Rapport with the Environment to be more strongly related to Factor R. The two items were: "Is it difficult to 'lose yourself' even at a lively party?" and "Do you usually become so absorbed in watching an athletic contest that you completely forget yourself?" It might be maintained that of Factors S, T, and R, the latter comes closest to Jung's original idea of introversion-extraversion. It might also be said that "rapport with the environment" is the core idea of his conception. If the latter statement is true, however, it is very doubtful that Factor R of the present analysis should be identified with Jung's concept of introversion-extraversion.

The relation of Variable 52 (Liking for Action and Excitement) to Factor Ag is probably due to one of its three items, which reads: "Do you like to play pranks on others?" It is probable that the prank-playing of the happy-go-lucky person is of the puckish variety, while that of the belligerant (low Ag) person is of the vindictive variety.

The relationship of the quality of cheerfulness to both R and D has been found in a previous study (6). Cheerfulness has a different flavor or significance when it is opposite to depression than when it is a feature of a happy-go-lucky disposition. Not all cheerfulness, obviously, carries with it an unconcern or lack of seriousness.

The loading of −.38 on Factor R for the test of Energy is interesting. It suggests that Factor R is not entirely a matter of putting on the brakes. Perhaps there is also involved a lack of motivation to act in directions that ordinarily call for brakes. Then, of course, there is the suggestion of energy expenditure in the happy-go-lucky person who likes excitement.

The three O variables leading this list identify the factor. All four of the O tests introduced in the analysis have significant loadings. The picture of the factor is much the same as before, except that the egocentric aspect is not so strong, Test 55 having lost the greater part of its common-factor variance to Factor I.

C. OBJECTIVITY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 57 | Ideas of Reference | −.54 | (I | −.35) | | | | |
| 58 | Unwarranted Sympathy | −.53 | | | | | ($C_1$ | −.35) |
| 56 | Hypersensitivity | −.42 | | | | | | |
| 38 | Worry, Anxiety | −.40 | | | | | (D | .56) |
| 68 | Suspicion of Actions | −.39 | (Ag | −.36) | (Co | −.40) | | |
| 62 | Overt Aggression | −.36 | (Ag | −.45) | (Co | −.34) | | |
| 54 | Rapport with the Environment | .35 | | | | | | |
| 42 | Feelings of Guilt | −.35 | (I | −.34) | | | ($C_2$ | .32) |
| 29 | Social Poise | .35 | (I | .46) | | | (S | .46) |
| 55 | Egocentrism | −.31 | (I | −.52) | | | | |
| 69 | Victim of Hard Luck | −.31 | (Ag | −.31) | (Co | −.35) | (N | −.33) |
| 18 | Feeling of Adequacy | .30 | (I | .34) | | | (G | .38) |
| 19 | Self Confidence vs. Inferiority | .30 | (I | .45) | | | (G | .34) |
| 22 | Tense-excited vs. Calm-relaxed | −.30 | (I | −.30) | | | (N | −.40) |

In general, O, like Factor I, has an unusually long list of tests related to it. It shares variances in many of the same tests with I. The explanation is probably much the same as in the case of Factor I. It is probable that many items refer to things about which examinees are "touchy" and there is a tendency to respond to those items with systematic bias. Some correlation is thus generated between such item groups (tests) and Factor O. People are often "touchy" about things concerning which they feel inferior, hence I and O would tend to be correlated with the same tests. Factors I and O, according to this hypothesis, represent two foci of generalized feeling about one's personal characteristics; a feeling that is systematically indicated in terms of relations of many tests to these two factors and of I and O tests with one another.

It was noted earlier that Factors I and O seem to be correlated to the extent of +.12. This is a surprisingly small figure, in view of the many tests in which the two factors are related. It does not account for all the correlations between I and O tests, which suggests the possibility of reducing many score intercorrelations that are due to these general biases, with improved item writing and item selection.

Another small correlation of about +.12 may exist between O and Co, indicating that the more objective person is also slightly more free from critical faultfinding and that the subjective person, who dislikes criticism himself, is more likely to criticize others. From clinical evidence one would expect this correlation to be greater.

All four of the Ag tests used in this battery are at the head of the list. The two Ag tests without significant secondary loadings indicate that the person low on Factor Ag resents domination by others and carries feelings of hostility. Also high in the list is an attitude of contempt for others and a readiness to indulge in overt aggression.

The evidence is that Ag has correlations with two other factors, G and Co. There is nothing in the list above to suggest relationship to G, but the estimated correlation is −.44. This fact was discussed in connection with the treatment of Factor G.

It is very difficult to draw a conclusion as to the correlation between Ag and Co (*cooperativeness*, *tolerance*). If we confine our attention to Test 64, which has a zero loading on Ag, and to Test 27, which has a zero loading on Co, we should conclude that the factors are orthogonal. But neither test has a very large loading on its respective factor, the projections being .40 and −.38, respectively. If we were to ignore either of them, but not the other, the consequent rotation of the axis near it would result in an angle of separation of about 70 degrees and a correlation of +.34 between axes. If we were to ignore both these tests,

**Ag. AGREEABLENESS**

| | | | | | |
|---|---|---|---|---|---|
| 60 | Resistance to Control | −.62 | | | |
| 59 | Contempt for Others | −.61 | (Co −.39) | | |
| 61 | Hostility | −.59 | | | |
| 62 | Overt Aggression | −.45 | (Co −.34) | (O −.36) | |
| 67 | Suspicion of Hypocrisy | −.45 | (Co −.62) | | (I −.32) |
| 27 | Liking for Friends and Acquaintances | .40 | | | (S .45) |
| 25 | Annoyance and Irritability | −.39 | | | (N −.40) |
| 66 | Doubting Honesty of Others | −.37 | (Co −.53) | | |
| 68 | Suspicions of Actions | −.36 | (Co −.49) | | |
| 52 | Liking for Action and Excitement | −.33 | | | (R −.50) |
| 69 | Victim of Hard Luck | −.31 | (Co −.35) | (O −.31) | (N −.33) |
| 65 | Faultfinding with Industry | −.30 | (Co −.66) | | |

the axes would be separated at an angle of about 45 degrees, indicating a correlation of +.71. Now the correlation of the total scores for Ag and Co in the Lovell data was .63. It is probable that the correlation of factors is lower than that figure, hence the estimate of .71 seems definitely too large. From the opening remarks of this discussion, we could even conclude that the correlation between Ag and Co is as low as zero.

The last alternative seems more plausible if we examine the nature of Tests 64 (Faultfinding with Society) and 27 (Liking for Friends and Acquaintances). Why is Test 64 orthogonal to Ag while the other faultfinding tests are not? It might be that the items on faultfinding with society, unlike those on faultfinding with people and with industrial situations, refer to more abstract evils or threats against which personal attack is not so obviously implied, hence their freedom from relationship with Ag. On the other hand, it may be that Ag items generally arouse the critical reaction of the unbelligerent faultfinder as well as the more aggressive reaction of the belligerant retaliator. Items in Test 27 emphasize friendliness but not opposite to the negative pole of Co. It is not unthinkable that items of still other classes might be written so as to discriminate more sharply and strongly between Ag and Co than Tests 64 and 27 seem to do.

Of the seven tests designed for Factor Co, five lead the list above, and all seven are present. Only one test (64) escapes having secondary loadings, but another (65) comes very close to the margin. All three tests have to do with faultfinding and they reveal a discontented person who seems to find something wrong about things in general. This, of course, defines the negative end of the dimension. Suspicions of the motives and actions of others complete the unfavorable picture.

The fact that items designed for Co commonly carry implications of Ag and vice versa was noted in discussing Ag. It was concluded that the degree of correlation between Ag and Co is very much in doubt. Some other correlations with Co have been mentioned, including a minor correlation of −.12 with M and another minor correlation of +.12 with O. These results indicate that the tolerant person is more likely to be feminine and objective. Both correlations are so small as to be of little consequence.

We shall have to consider several hypotheses concerning the nature of this factor without coming to any final conclusion as to its definition or its name.

The leading quality of impulsiveness here strongly suggests that this may be the impulsiveness factor. French lists such a factor (1) and the senior author found a factor of this type in one analysis (6). But a more general aura of instability or lack of control is generated by several variables in the list. The items on absentmindedness stress inability to concentrate (two items out of three): "Does your mind wander badly while you are trying to concentrate?"

Co. Cooperativeness (Tolerance)

| | | | | | |
|---|---|---|---|---|---|
| 63 | Faultfinding with Human Nature | −.68 | | | ($C_1$ −.34) |
| 65 | Faultfinding with Industry | −.66 | (Ag −.30) | | |
| 67 | Suspicion of Hypocrisy | −.62 | (Ag −.45) | | (I −.32) |
| 66 | Doubting Honesty of Others | −.53 | (Ag −.37) | | |
| 68 | Suspicion of Actions | −.49 | (Ag −.36) | (O −.39) | |
| 59 | Contempt for Others | −.39 | (Ag −.61) | | |
| 64 | Faultfinding with Society | −.38 | | | |
| 55 | Egocentrism | −.37 | | (O −.31) | (I −.52) |
| 69 | Victim of Hard Luck | −.35 | (Ag −.31) | (O −.31) | (N −.33) |
| 62 | Hostility | −.34 | (Ag −.45) | (O −.36) | |

$C_2$. (UNIDENTIFIED)

| | | | | | | |
|---|---|---|---|---|---|---|
| 50 | Impulsiveness | .62 | | (G .35) | | |
| 47 | Absentmindedness | .51 | (N −.36) | | | |
| 43 | Emotional Fluctuations | .44 | (D .50) | | | ($C_1$ −.30) |
| 24 | Nervousness and Jumpiness | .40 | (N −.69) | | | |
| 40 | Loneliness | .34 | (D .36) | (T .32) | | |
| 12 | Inhibition of Emotional Expression | −.32 | | | | (M .30) |
| 42 | Feelings of Guilt | .32 | | (I −.34) | | (O −.35) |

and "Does your mind wander badly so you lose track of what you are doing?" The implications from the variables Emotional Fluctuations, and Nervousness and Jumpiness are more obvious in this connection.

It seems apparent that something more than impulsiveness is involved. The very general term "emotional instability" might be applied, but perhaps a more univocal term could be found.

Another possibility is that this is, after all, the cycloid factor that we hypothesized at the start. While the key variable Emotional Fluctuations does have a higher loading on this factor than on Factor $C_1$, at the same time, it has a higher loading on Factor D than on either $C_1$ or $C_2$. The greatest weakness in this hypothesis is the fact that only one other C variable has a significant loading here—Absentmindedness—whereas four others have significant loadings on $C_1$.

We accept as final none of these hypotheses, but suggest, as before, that there is need for a new analysis in the general area of these emotional factors based upon the intercorrelations of items. We are now in a much better position than before to make a wise choice of items for such a study. There would be no objection, of course, to the use of very short tests, if we could be sure that each test is highly homogeneous.

## DISCUSSION

We have presented each factor in turn, dealing with its properties and with its external relationships, and mentioning some of the implications. There remain some more general considerations, affecting some or all factors, that should be of interest. First, there is the question of how well the results fit or support the hypotheses with which the investigation was started. Second, there is the over-all question of the extent to which the factors are intercorrelated, and of whether any general principles emerge from those intercorrelations. Third, we shall summarize in one place the apparent properties of each factor in turn.

*General fit of the data to the hypotheses.* We started this investigation with the hypothesis that the 13 factors allegedly measured by the three inventories would be found by a new analysis in which every factor is represented by at least three scored variables. Although we have already pointed out places where predicted factors and their properties are verified and where they are not, let us give some attention now to the general picture of factor verification.

In terms of the number of factors verified, we may say that 12, and possibly 13, of the 13 factors that were hypothesized were actually found in the analysis. The notable exception would be that two factors emerged in the area where the cycloid-disposition factor was expected. Although neither has all the properties of that factor, one of them ($C_1$) has most of them.

The identification of our obtained factors with previously known factors has been largely on an intuitive basis. There are no rigorous statistical tests to rely upon when making decisions as to identities of factors. However, we can be a little more objec-

tive about the matter, using certain indications from the data themselves.

Let us consider first to what extent the test variables that were expected to have significant loadings on certain factors fulfilled those expectations. If we call Factor $C_1$ the verification of Factor C, we can report that only six of the 70 variables failed to show significant loadings on their respective factors. There was one such discrepancy each in the case of Factors G, D, and C, and three discrepancies in the case of Factor R. From the point of view of expected significant loadings, then, about 90 per cent of the predictions were fulfilled.

Another index of the goodness of our predictions is based upon the number of times a test variable designed for a factor had a higher loading on some other. This criterion is not clear-cut, since it is expected that many items will have relation to more than one factor. It is also expected, however, that the secondary loadings would be smaller.

For seven factors—G, A, M, N, T, Ag, and Co—there were no assigned tests having higher loadings on other factors. Factors I, S, D, and O each had one test with a higher loading on another factor. As we should expect from previous discussions, the greatest discrepancies of this kind occurred for Factors C and R. Of the six tests for Factor C, four had higher loadings on factors other than $C_1$. Two of these higher loadings went to Factor D, one to $C_2$ and one to M. Of the six tests for Factor R, three had higher loadings elsewhere. One went to Factor A, one to O, and one to $C_2$. Thus, altogether, only 11 of the 70 tests had higher loadings elsewhere than predicted, and the differences were usually small.

Before reaching this point, a few readers have probably thought of the cliché, "You get out of a factor analysis just what you put into it." If the term "just" is taken to mean "exactly," we have abundant evidence from this analysis, and from others, that the statement is definitely not true. We sometimes wish it were possible to come nearer to fulfilling the statement in this sense than we or others seem able to do.

If the statement is intended in a general sense, we are willing to accept it. For then it applies to an experiment as well; we get out of an experiment, also, what we put into it. In a factor analysis of memory tests we expect to find memory factors. Of course, some nonmemory factors will come out of it, too, if they "were put into it." But sophistry aside, a factor solution such as is reported here is usually a rather compelling one. It would be virtually impossible to force the rotational solution so as to bring out 14 quite different, coherent, psychological variables, with a geometric structure that looks as good as the one obtained.

The most profitable way to begin a factor-analysis investigation, where one can do so, is to set up definite hypotheses concerning what factors are present in the area of study and what their properties probably are. When there has been much prior information, as in the present study, we may make enlightened predictions of the outcome. If the predictions are fulfilled, we have supported the hypotheses. The basic logic behind our experimental design is much like that of a cross-validation study.

In the attitude to be taken toward the results, there is nothing actually *compelling* us to accept the hypotheses as true. We merely accept them with more or less confidence. This is also true of the outcome from any method of investigation. The degree of acceptance of particular hypotheses lies on a scale of confidence or of permissiveness. The scientist's own judgment as to where a hypothesis belongs on this scale depends upon his attitude toward the method and the data.

*Intercorrelations of the factors.* We shall now discuss briefly and generally the question of

intercorrelations of the factors. We are referring, of course, to the psychological factors.

In general, we rejected the use of an oblique rotational solution and the opportunity that it would have provided for estimating intercorrelations of factors. The degree of obliqueness between two primary axes is very dependent upon what particular tests of the factors one happens to have in the battery. There are many instances in which tests for one factor show systematically some affiliation with another factor because one or more items are slanted in that direction. Many times, in spite of this situation, which in an oblique solution would probably be taken to indicate correlated factors, one or more tests of the one factor still have orthogonal relations to the other. Such factors may be regarded as uncorrelated.

It was interesting to find that certain factors more than others tended to have significant loadings in two or more tests of certain other factors, or vice versa. One of these was Factor I (*confidence vs. inferiority feelings*), which had such relationships with Factors G (*general activity*), A (*ascendance*), N (*calmness, composure vs. nervousness*), and O (*objectivity*). These relationships could be attributed in part to small correlations between Factor I and others, and in part to items slanted toward I, or items in I tests slanted toward other factors. It is probable that many items were slanted toward I because they pertain to strengths and weaknesses of the individual. The examinee's appraisal of himself in such items one at a time tends to be consistent with his appraisal of himself on the items more frankly and directly dealing with Factor I; hence the correlations.

A similar hypothesis probably applies to Factor O, which showed an unusually large number of relationships to test variables designed for other factors, including G, I, Ag (*agreeableness*), and Co (*cooperativeness, tolerance*). The negative pole of Factor O is hypersensitivity. Many items, evidently, especially among those scored for this group of factors, probably pertain to things about which considerable sensitivity is felt. The "touchy" reaction to them tends to generate correlations with O items in which this generalized trait is featured.

Concomitance of significant orthogonal-factor loadings for two factors in several tests is not necessarily an indication that the factors are correlated. The indicator of factor correlations to which we paid most attention involves first steps toward oblique rotations that start where our orthogonal rotations left off. Using the rotated factor loadings of Table 2, we plotted the pertinent test vectors in all planes where nonorthogonality was suspected. Where oblique rotations seemed to be called for, we determined the angle of separation that this would entail, and from this an estimate of the correlation of the oblique axes. The method is admittedly rough, but it may serve to show where nonzero correlations probably exist and whether they are in the positive or the negative direction.

A relatively small number of pairs of factors proved not to be orthogonal: 16 out of a possible 105. The coefficients estimated are generally small or moderate. No general pattern or principle seems apparent; the correlations are fairly well scattered, though some factors are involved in more than their share of correlations. The correlations indicated for each factor may be summarized as follows:

G: small positive with $C_1$: moderate negative with Ag.[11]
A: moderate positive with I.
M: small positive with O; small negative with S and Co.
I: moderate positive with A; small positive with N, S, and O; small negative with $C_1$.

[11] A low correlation is defined as below .40 and a high one as .70 and above. The positive pole of each factor is as named in the list to follow.

N: small positive with I; moderate negative with D.
S: small positive with I; small negative with M and R.
T: small positive with D.
D: small positive with T; moderate negative with N.
$C_1$: small positive with G and $C_2$; small negative with I; high negative with R.
R: small negative with S; high negative with $C_1$.
O: small positive with I and Co.
Ag: moderate (?) positive with Co; moderate negative with G.
Co: small positive with O; moderate (?) positive with Ag; small negative with M.
$C_2$: small positive with $C_1$.

*New descriptions of factors.* Those who have dealt with measurements of the 13 factors of the Guilford inventories previously will be interested in the revised conceptions of the factors as indicated by the analysis. The factor descriptions are summarized here. In each case, unless otherwise specified, the high-scoring individual is described.

G. *General activity:* Energetic, rapid-moving, rapid-working person, who likes action and may sometimes be impulsive.

A. *Ascendance:* The person who upholds his rights and defends himself in face-to-face contacts; who does not mind being conspicuous, in fact may enjoy it; who through social initiative gravitates to positions of leadership; who is not fearful of social contacts; who is not inclined to keep his thoughts to himself. There is little to indicate that "submission" accurately describes the negative pole, as was formerly believed.

M. *Masculinity vs. femininity:* Has masculine interests, vocational and avocational; not emotionally excitable or expressive; not easily aroused to fear or disgust; somewhat lacking in sympathy.

I. *Confidence vs. inferiority feelings:* Feels accepted by others, confident, and adequate; socially poised; satisfied with his lot; not self centered.

N. *Calmness, composure vs. nervousness:* Calm and relaxed rather than nervous and jumpy; not restless, easily fatigued, or irritated; can concentrate on the matter at hand.

S. *Sociability:* Likes social activity and contacts, formal or informal; likes positions of social leadership; has social poise; not shy, bashful, or seclusive.

T. *Reflectiveness:* Given to meditative and reflective thinking; dreamer; philosophically inclined; has curiosity about and questioning attitude toward behavior of self and others.

D. *Depression:* Emotionally and physically depressed rather than cheerful; given to worry and anxiety and to perseverating emotions and changeable moods.

$C_1$. *Emotionality:* Emotions easily aroused and perseverating, yet shallow and childish; daydreamer. (Not identical with Factor C.)

R. *Restraint vs. rhathymia:* Self restrained and self controlled; serious minded rather than happy-go-lucky; not cheerfully irresponsible.

O. *Objectivity:* Takes an objective, realistic view of things; alert to his environment and and can forget himself; not beset with suspicions, hypersensitivity, unwarranted sympathies, anxiety, or feelings of guilt.

Ag. *Agreeableness:* Low-scoring individual is easily aroused to hostility; resists control by others; has contempt for others; and may be aroused to aggressive action. High-scoring person is friendly and compliant.

Co. *Cooperativeness, tolerance:* Low-scoring person is given to critical faultfinding generally; has little confidence or trust in others; self centered and self pitying.

## Summary and Conclusions

The purpose of this investigation was to

re-examine the potential evidence for and against the existence of the 13 factors purported to be measured by the Guilford-Martin personality inventories. The factors had originally been discovered by analysis of intercorrelations of single items, some of the results of which had never been published. Two analyses, by Lovell and Thurstone, based upon the 13 total scores from these inventories, had been interpreted to cast doubt upon the existence of the 13 factors.

In the present study, Lovell's basic data were again analyzed, but the intercorrelated variables were part scores rather than total scores. At least three relatively homogeneous short tests were made up of items scored for each of the 13 hypothesized factors, making 69 score variables altogether. A 70th variable of sex membership was added. Eighteen centroid factors were extracted and the axes were rotated orthogonally. The conclusions are:

1. The number of dimensions needed to account for the intercorrelations is at least 14, the number that could not be considered as residual factors.

2. The close agreement of the results to the hypotheses is indicated by two criteria:

*a*. Only six of the 70 test variables failed to have significant loadings (.30 or higher) on the factor for which they have been scored previously in the inventories.

*b*. Only 11 of the 70 variables had higher loadings in factors other than those for which they have been primarily scored in the inventories.

3. Thirteen factors could be interpreted as being nearly the same as those hypothesized. Some qualifications follow.

4. Interpretations of most factors were modified slightly, in most cases providing clarified pictures of the factors. Some of the greater changes were:

*a*. Factor R lost its impulsiveness aspect, which leaves the way open for a separate impulsiveness factor, that has been found in other analyses.

*b*. Factor C lost its most distinctive feature, the tendency to have fluctuations of mood. This left a factor that we have called "emotionality," but which might be more restrictively defined as "emotional immaturity."

5. The 14th factor has a strong impulsiveness aspect, but the general picture suggests a broader trait than that; perhaps an "emotional instability."

6. Intercorrelations among factors, so far as can be ascertained indirectly from the orthogonal solution, seem to be very close to zero, with relatively few exceptions.

7. Factors I (*confidence*) and $C_1$ (*emotionality*) show the largest numbers of nonzero correlations with other factors. Other factor intercorrelations are unsystematically distributed.

8. Partly due to factor intercorrelation and partly due to impure tests, two clusters of relationships of tests to factors were found:

*a*. One involves Factor I with G, A, N, O, and Co. It was hypothesized that the examinee's own evaluations of his strengths and weaknesses in these areas, particularly, have a relation to his general feeling of adequacy. A general halo or bias is thus involved.

*b*. Factor O is similarly involved with G, I, Ag, and Co. A similar hypothesis was proposed, to the effect that items in the latter groups pertain to things about which examinees are systematically hypersensitive. Thus another bias is produced, but it is not independent of the first.

9. A revised list of the properties of each factor is given in the general discussion.

10. It is urged that better item writing can do much to discriminate among the factors and to clarify information about their intercorrelations.

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